

# **REMARKS FOR ADMINISTRATOR BOLDEN**

## **WORLD AFFAIRS COUNCIL**

### **NASA in a Dynamic International Environment**

March 31, 2012

Thank you all for inviting me to speak to the Northern California World Affairs Council.

Even though I was a long-time member of the Houston World Affairs Council, the last time I addressed a Council was in Los Angeles in August 2010. We were still several months away from the last flight of the Space Shuttle Program, but now we have successfully completed that program's amazing 30 year history and are in the early days of the next great era of space exploration.

In February, it was my privilege to share NASA's FY2013 budget request -- a \$17.7 billion dollar blueprint for NASA and the Nation to embark on an ambitious plan of space exploration that will take us farther into the solar system than we have ever gone before.

Despite a constrained fiscal environment, this budget continues to ambitiously implement the space exploration program agreed to by the President and a bipartisan majority in Congress . . . laying the foundation for remarkable discoveries here on Earth and in deep space.

This gathering has been discussing what may lie ahead in the coming decades. The people heading the space program of those times -- and I am confident there will definitely be a vibrant space program 40 and more years beyond today -- will look back at some of our actions today as the building blocks on which that future was created.

I am talking about the development of new technologies such as in-space propulsion, on-orbit fueling depots, precision landing, and many others on which we have our eyes today – technologies that will be essential for reaching destinations beyond low Earth orbit (LEO). I am talking about the heavy lift rocket and crew capsule that right now are undergoing tests and refinement for human missions farther into the solar system.

I am talking about creation of an entirely new segment of the economy, brought about by commercial access to LEO, not only for government users, but industry, academia, and private citizens.

I am talking about science continuing to rewrite textbooks and taking us ever further in our quest for knowledge about our planet, our universe, and ourselves.

I'm talking about something that relates to everyone in this room – the next generation air transportation system (NextGen) that includes new types of airplanes and many new technologies to make them, the airspace, and the airports more fuel efficient and more environmentally friendly. I want to remind everyone that we also have spaceports – these already exist in this country at the Kennedy Space Center, at Wallops Island in Virginia, in Mohave, CA, and in New Mexico, to name a few.

The success of our modern exploration effort will be judged, in part, on how well we continue to make space exploration about global partnership. Particularly since it is clear that no one nation can do it alone and the benefits to be gained are for all of humanity.

With NASA's long history of successful international cooperation, and more and more nations reliant on space based capabilities to support their day-to-day lives, I have every reason to believe that we will continue to build strong relationships around the world and create a unified effort for expanding humanity's horizons beyond our planet.

Whether that means sending an astronaut to orbit, designing experiments, being the main supplier of a crucial part on one of our new observatories, or being a researcher who analyzes data from our spacecraft, there is going to be a role in exploration for everyone who wants to participate.

The period in which we now live represents a once-in-a-generation shift from a flagship program, the space shuttle, to a new way of doing things – a new paradigm, and a new set of priorities.

What does this mean for the future? NASA is in the future business and that means shaping tomorrow and helping us to reach our higher potential as human beings.

It is a very exciting time to be involved in space exploration. The retirement of the space shuttle last July after 30 incredible years of flight represented a bittersweet time for NASA, but the next great era of space exploration is quickly taking shape. In fact, our most recent call for astronauts drew more than 6300 applications, the second highest we have ever had. Some from this group will become the NASA Astronaut Class of 2013. They are going to be the ones who will pioneer new ways of reaching space on commercial vehicles and possibly travel to an asteroid and lead the way for those who will go to Mars in the 2030s.

Space exploration strengthens us all, not only with the new discoveries we make, but with the numerous technologies that are developed with applications toward improving life on Earth. Besides that, it brings us together as one world.

In addition to all the science and research on human health that has been and continues to be conducted on the International Space Station (ISS), one of the Station's historic achievements is how it demonstrated that many nations could work together on a project of enormous scope, complete it, and then keep it going. Fifteen nations contributed to the development and assembly of the International Space Station and even more are or will soon become involved in the program through their utilization of this amazing research facility on-orbit.

The ISS represents our toehold to the rest of the solar system. What we learn there is going to make it possible for us to venture farther. It will help us become a truly spacefaring people.

Already, we have had people in orbit 24/7 for more than 11 years. Just the thought of this would have been science fiction when I was a child.

Not only is the ISS the largest, most complex international scientific and engineering program in history, it is a test bed for future technologies and systems and is a tangible symbol of unprecedented international cooperation. Just take a look outside on a clear evening and you might see a very bright shining star moving overhead. That is the International Space Station – the temporary home for international crews living and working in space.

The Station is a world-class laboratory that conducts full-time research.



Now that its construction is completed, we expect many more partnerships in the future with academia, industry, other U.S. agencies, and as I mentioned earlier, other countries, to help bring it to its full potential and fully utilize this incredible investment.

Within the next month or two, we expect the private company, SpaceX of Hawthorne, CA, will launch and berth an uncrewed cargo vehicle to the Station, demonstrating a new capability -- the first time a commercial entity will have done this. Later this year Orbital Sciences Corporation, another commercial entity is planning to conduct its first demonstration mission of a similar cargo resupply capability. By 2017, we at NASA are planning to rely on American companies for crew transportation and rescue services to low Earth orbit. NASA is currently working with the private sector to incentivize companies to build and operate safe, reliable, and cost-effective commercial human space transportation systems.

Initially, NASA plans to be a partner with U.S. industry, providing technical and financial assistance during the development phase.

In the longer term, NASA plans to be a customer for these services, procuring transportation services for U.S. and U.S.-designated astronauts to the space station.

These are just a few of the many milestones on our path to opening that new sector of the economy that we think will be a job creating engine for generations to come. This reliance on American industry will change our relationship with space and make it much more a part of everyone's daily life.

The economic benefits of exploration are one of the reasons that it will be a key component of our future. As I have said before, every dollar we spend on space exploration is spent right here on Earth. It represents good jobs and innovation and pushes the envelope of our capabilities.

Our new Space Technology Program currently involves more than 1000 projects. It is generating the ideas and innovations that will take us farther. Ideas such as solar-electric propulsion and lightweight cryogenic propellant tanks are things to which we have recently directed resources, just to name a few. We are targeting a launch of a cryogenic propellant storage demo in 2016.

Our new 2013 budget provides for this type of work and projects like the three technology demonstration mission proposals we selected this past year to transform space laser communications, deep space navigation using atomic clocks, and in-space propulsion capabilities, including solar sails.

In aeronautics, our investments are driving technology breakthroughs for cleaner, safer, quieter, and more efficient aircraft.

In fact, NASA funded three industry/academia teams to explore new vehicle concepts that could achieve those goals and enter into commercial service in 2025 (two generations after the current state-of-the-art aircraft). The teams created technology development roadmaps and identified critical technology demonstrations necessary to make those aircraft a reality.

The results of these studies, released in January 2012, are helping NASA and industry to prioritize research investments to make that future a reality.

Science is an area that has always been characterized by a great deal of international cooperation and where we are continuing to expand our partnerships, both as the leader and as a contributor to partner-led initiatives.

Who could have guessed that by 2012 we would have documented hundreds of extra-solar planets, learned about some of their characteristics and started to identify some that might be Earth-like? With the James Webb Space Telescope, we will be looking at light from near the beginning of the universe. It doesn't get much bigger than that when you contemplate the larger implications of our work.

We are going to keep trying to answer questions that continue to fascinate humanity. Is there life on Mars or else in our universe for that matter? The *Curiosity* rover landing on the Red Planet in August may shed some light on whether or not Mars may once have been hospitable to life or may even be so today.

What is it like in interstellar space? The *Voyager* spacecraft, which have been en route for more than 30 years, could break out of our solar system within our lifetimes.

In education, we're focusing on programs with measurable returns. This will help us feed that pipeline we so urgently need of new scientists and engineers to share their energies, passions, and great intelligence with us. Last year we also provided 80 space technology research fellowships to graduate students to complete their studies and join us in tomorrow's missions.

You know, you can develop all the technology you want, but in the final analysis, all this is about people. It's about making life better here on Earth; about improving the human condition; expanding our knowledge; and expanding our partnerships across Earth in pursuit of a larger goal that none of us could accomplish on our own. We have numerous demonstrations of this right now, from the International Space Station, to the SERVIR program where scientists around the world use space data and their own ground-based observations to help us better understand and predict our planet's changes.

Everywhere I go, I see the fire in the eyes of students who are just learning how important science, technology, engineering and mathematics are to understanding our world, and how they can make a real difference by pursuing those career paths. So, the future to me looks bright.

We look forward to continuing our leadership in space exploration in the global community, building on the strong relationships we have now and talking to “non-traditional” partners. These are the countries with whom we haven’t worked a lot in the past or maybe not at all. In some cases they may not even have their own space programs.

At the end of the day, it is people from around the world sitting across the table from one another who must decide if together we can bring a complex mission of exploration of our universe to successful completion.

I saw potential of this cooperation firsthand when I commanded NASA's first "mission to planet Earth", ATLAS-1, with Belgium's first ever astronaut, Dirk Frimout, and a complement of 13 international experiments to study our Sun and Earth's middle atmosphere in ways never before accomplished. It was displayed again two years later when I was privileged to command the first joint Russian-American Space Shuttle mission with a Russian Cosmonaut, Sergei Krikalev, as one of our mission specialists crew members. The relationships we developed on those missions and others served as precursor to our extremely successful cooperation on the Russian Space Station, Mir, and ultimately on the International Space Station.

Since NASA was founded 52 years ago, international cooperation has been one of our cornerstones. We have entered into about 4000 agreements in that time with more than 120 nations touching almost every aspect of NASA's activities.



Right now NASA has 535 active international agreements, conducting some form of ground-based research on every continent and working with nations around the world to develop and implement the next generation of space exploration missions. This cooperation is the definition of win/win, bringing multiple benefits to everyone involved.

I am truly proud that NASA's work stretches far beyond America's borders and has a positive impact on people's lives in places far from our shores. I believe that space exploration is good for the world, and I see America continuing to lead global exploration efforts. Government-to-government relationships that might otherwise be difficult continue to improve, using science and technology as a basis for common understanding and agreement.

Whatever the situation looks like in 2050, it will be people sitting across the table from each other as I was with my fellow heads of several space agencies last month in Quebec City, Canada, talking about our progress and our challenges and what we want to do together in the coming decades. There are a lot of frontiers within the broad scope of space exploration, and as such, there is likely something exciting going on right now in some part of the world that may someday help us to further humanity's understanding of those frontiers. Because we all inherently share a need to explore, I firmly believe that individuals and nations will continue to be drawn together by the promise of space exploration.

Thank-you so much for allowing me to join you today to participate in this conference on "Navigating in a Shifting Global Landscape". I look forward to hearing your thoughts and ideas about how the frontiers of our ever-changing world may develop in the coming years.

